6 July 2007

M E M O R A N D U M

TO: Steve Ogle, Technical 1 Engineer
Boise Regional Office

FROM: Tina Kurtz, Scientist 1
Technical Services

SUBJECT: The Idaho Department of Correction Wastewater Reuse Permit Application Review -- LA-000088-03 (Municipal Wastewater Facility)

1.0 Purpose

The purpose of this memorandum is to satisfy the requirements of IDAPA 58.01.17.400 (Rules for the Reclamation and Reuse of Municipal and Industrial Wastewater) for issuing wastewater reuse permits. It states the principal facts and significant questions considered in preparing the draft permit conditions or intent to deny, and a summary of the basis for approval or denial with references to applicable requirements and supporting materials.

2.0 Process Description

The Idaho Department of Correction (IDOC) operates several correctional institutions located approximately 5 miles south of the Boise Air Terminal on Pleasant Valley Road. This particular wastewater treatment facility and accompanying land application operation receives influent from the Idaho Maximum Security Institution (IMSI), the Idaho State Correctional Institution (ISCI), the South Idaho Correctional Institution (SICI), and the South Boise Women's Correctional Center (SBWCC). The facility currently owns 145 acres, divided over two separate sites, which are employed for slow rate land application. The original site near Ten Mile Creek consists of 70 acres and is referred to as the Valley Site, while the newer 75 acre parcel east of the SICI is known as the East Site (Keller, 2007).

During the growing season, IDOC applies an average of 44.6 million gallons (MG) to the combined sites, with an average of 26.5 MG being applied to the Valley Site and 18.1 MG to the East Site (IDOC, 2003-2006). Each site has individual treatment facilities consisting of two treatment/storage lagoons and a chlorine contact chamber used to disinfect the wastewater to the permit-required 230 coliform forming units/100 milliliters (CFU/100 ml). Wastewater flows first into the aerated primary treatment lagoon and then into a storage pond where it is held prior to disinfection and land application. At the Valley Site, the treatment lagoon is a 13.23 million gallon (MG), 6-cell lagoon, encompassing 10.4 acres, where the first 2 cells and the last cell are aerated. The corresponding storage pond at this site is a PVC lined, 43.8 MG lagoon, whose surface area encompasses approximately 20 acres. At the East Site, the treatment lagoon is a 7.77 MG, 3 cell lagoon, totaling 5 acres, where the first 2 cells are aerated. The storage pond at the

East Site is slightly smaller than that at the Valley Site, with a storage capacity of only 38.1 MG and a surface area of 17.5 acres; it is lined with an exposed HDPE liner (Keller, 2007).

3.0 Summary of Events

The IDOC submitted its first wastewater reuse application in September of 1989 and received the subsequent permit (LA-000088-01) on December 29, 1989. This permit allowed for the application of up to 72.8 MG on 70 acres and expired on December 31, 1994. On July 21, 1993, DEQ administratively extended the expiration date of this permit until December 31, 1997. In March of 1996 a permit application was submitted for the new East Site facility and supplemental information for the re-permitting of the Valley Site was received on January 23, 1998. The corresponding permit, LA-000088-02, was issued on May 22, 1998 and expired on May 20, 2003. Due to miscommunications with the facility, a permit renewal application was not submitted until February of 2007. During the interim period IDOC has continued to operate under LA-00088-02.

During the last re-permit process IDOC also possessed an EPA National Pollutant Discharge Elimination System (NPDES) discharge permit (ID-002603-4) for the Valley Site which was issued on May 16, 1988. It allowed for the discharge of treated effluent into Ten Mile Creek if a dilution ratio of at least 10:1 was maintained during discharge. This permit expired on May 17, 1993 and the facility consequently submitted a permit renewal application in the same month. At that time EPA declared the discharge permit to be minor and extended the existing permit until the effective date of the new permit (DEQ, 1998). According to EPA records the facility does not hold a current permit; and based upon the information supplied by the facility's annual reports, this particular discharge option has not been utilized during this permit cycle.

4.0 Discussion

The following is a discussion of: soils, ground water, surface water, hydraulic management unit configuration, wastewater flows and constituent loading, site management, and compliance activities. Conclusions and recommendations are summarized in Section 5 below.

4.1 Soils

The Natural Resources Conservation Service (NCRS) has characterized the area, listing the principal soils for the Valley Site as Bissell loam (0-2 percent slopes) and Tenmile very gravelly loam (12-30 percent slopes); and the soils for the East Site as Chilcott-Sebree complex (2-4 percent slopes) and Colthorp cobbly clay loam (2-4 percent slopes). Bissell loam is derived mainly of mixed alluvium generated from igneous rock and contains a restrictive root layer which is greater than 60 inches. The majority of Tenmile very gravelly loam consists of sandy alluvium derived from granite and/or volcanic rock and also has a restrictive root layer which is greater than 60 inches. The Chilcott-Sebree complex, bedrock substratum, is composed mainly of volcanic ash, mixed alluvium, and loess over bedrock, derived from basalt. The depth to the restrictive rooting layer is approximately 40 to 50 inches. And finally, Colthorp cobbly clay loam is composed of mixed alluvium and loess over bedrock derived from basalt, with depth to

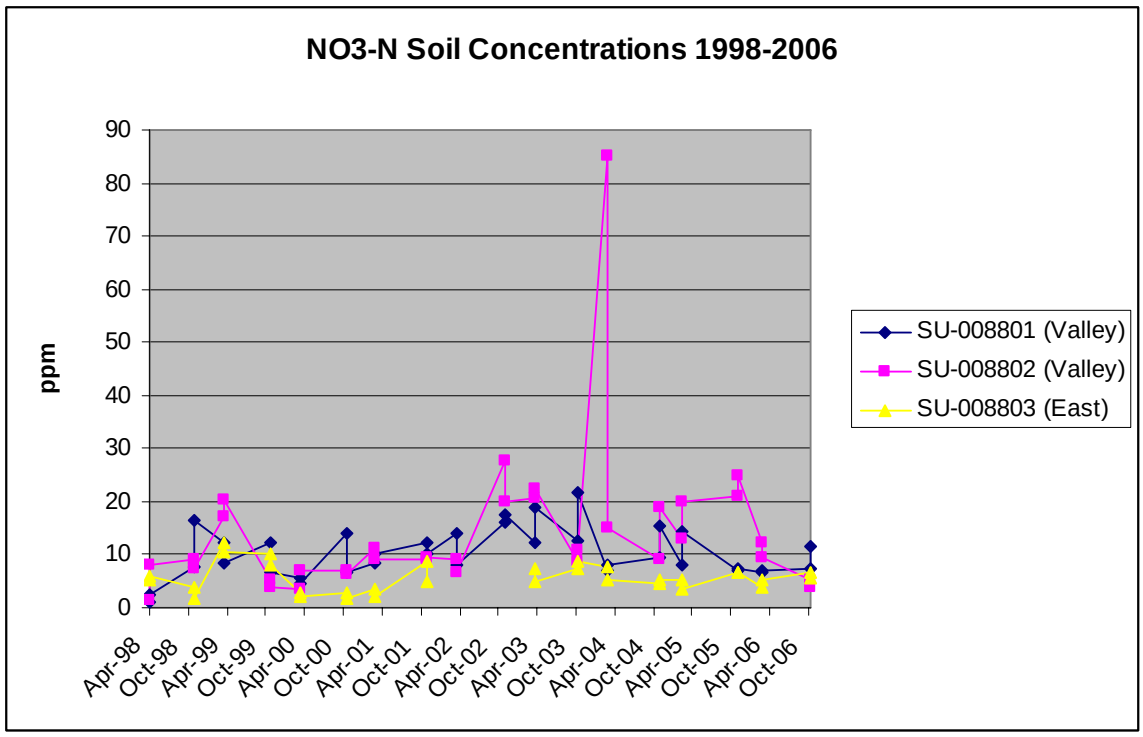
the restrictive root layer between 11 to 20 inches. All of the soils on both sites are characterized as well-drained; with slow to moderately slow permeability (NCRS, 2007).

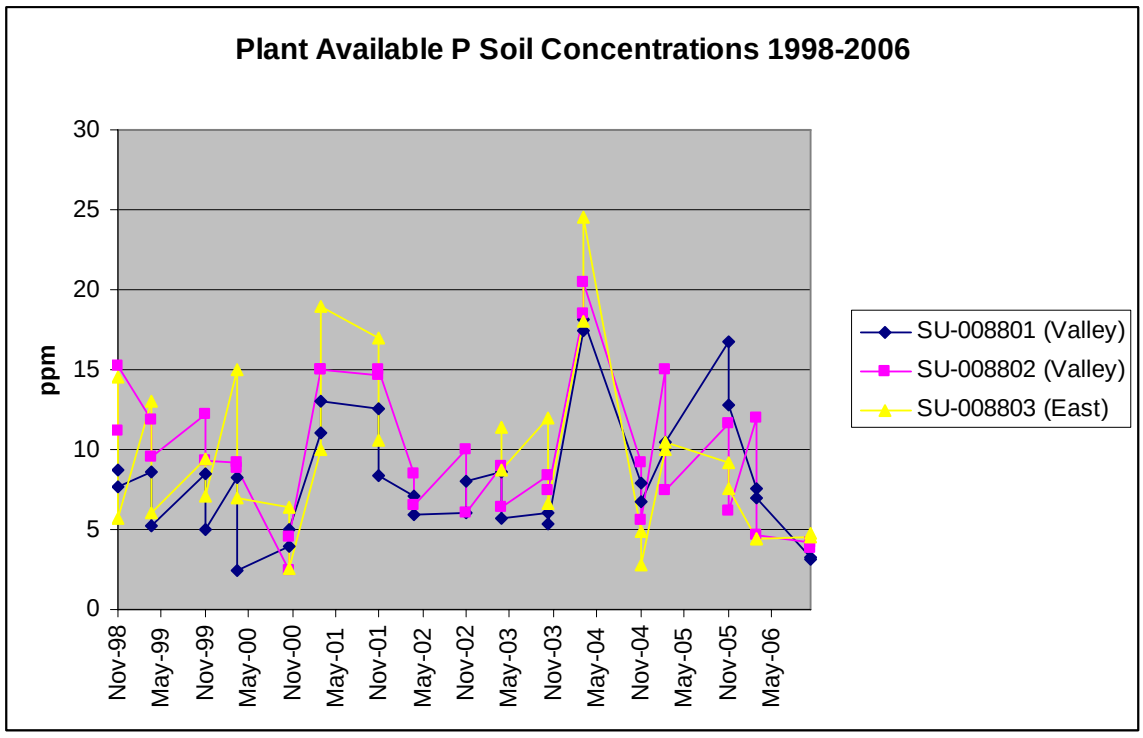
In addition to this characterization, soils on the East were surveyed by CES as part of the permit application submitted in March of 1996 for the land application expansion. Twenty test pits were dug across the site and CES was hereby able to divide the site into two distinct soil mapping units: Soil Unit A and Soil Unit B.

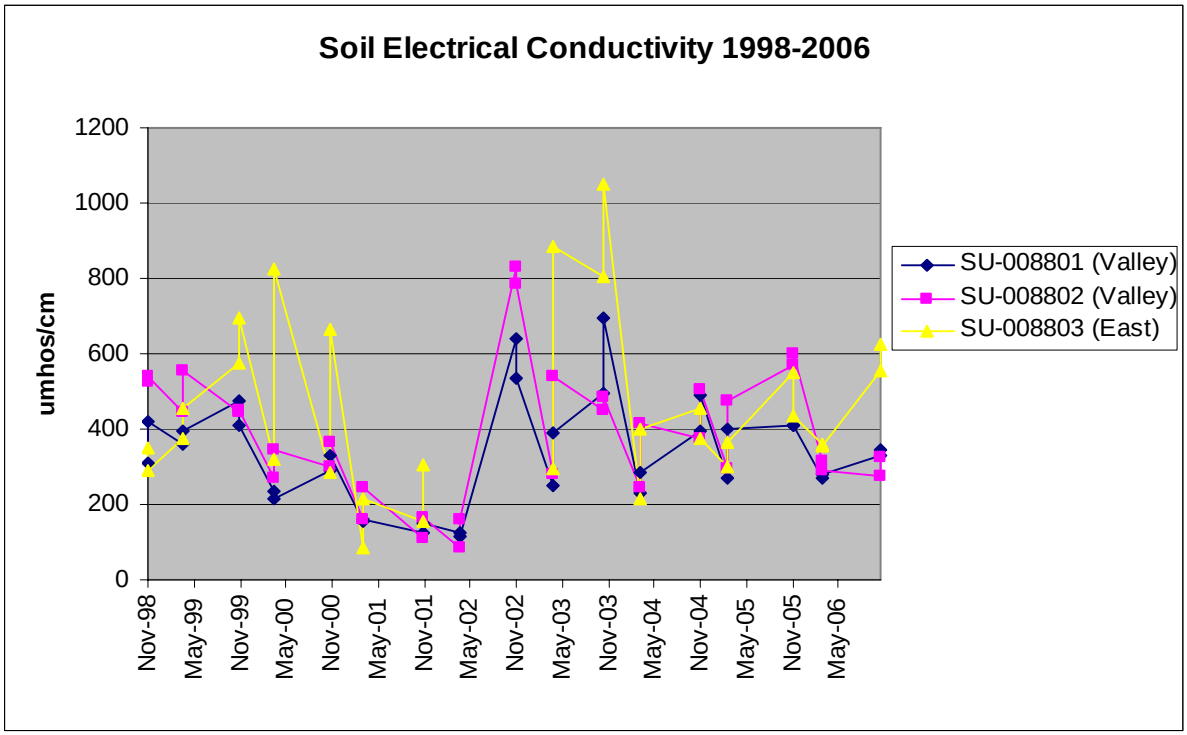
Soil Unit A at the East site consists of moderately deep well drained soils of which the first 7 inches are silt loam. Subsoils, from 7 to 22 inches, are composed of silty clay loam and silt loam. A hardpan occurs at approximately 22 inches below ground surface which is followed by highly jointed and fractured basalt at about 35 inches. Root growth is impeded at 22 inches or the top of the hardpan.

Soil Unit B also consists of moderately deep, well drained soils; however, the first 7 inches are composed of cobbly silt loam. The subsoils in the next 7 to 22 inches again consist of silty clay loam and silt loam. Hardpan also occurs at 22 inches in this unit, arresting root growth, and is again followed by the highly jointed and fractured basalt at 35 inches. CES also estimated the available water holding capacity (AWC) or water held in the soil that is available for crop use, in the first 22 inches of both units to be approximately 5.5 inches (CES, 1996).

The constituent concentrations in the soil at both the Valley and the East Sites are generally in the low to moderate range and have remained fairly consistent over the course of the permit term. Nitrate concentrations have been at the lower end of the moderate range, with average concentrations between 10 ppm to 14 ppm from1998-2006 at the Valley Site and 6 ppm at the East Site. Plant Available Phosphorus concentrations have been at the upper end of the low range with average concentrations between 8 ppm to 10 ppm since November of 1998 at Valley Site and the East Site. Please refer to the graphs below for soil constituent concentration trends from 1998-2006.


NO3-N Soil Concentrations 1998-2006
ppm
90
80
70
60
50
40
30
20
10
0
Apr-98
Oct-98
Apr-99
Oct-99
Apr-00
Oct-00
Apr-01
Oct-01
Apr-02
Oct-02
Apr-03
Oct-03
Apr-04
Oct-04
Apr-05
Oct-05
Apr-06
Oct-06
SU-008801 (Valley)
SU-008802 (Valley)
SU-008803 (East)


Plant Available P Soil Concentrations 1998-2006
ppm
30
25
20
15
10
5
0
Nov-98
May-99
Nov-99
May-00
Nov-00
May-01
Nov-01
May-02
Nov-02
May-03
Nov-03
May-04
Nov-04
May-05
Nov-05
May-06
SU-008801 (Valley)
SU-008802 (Valley)
SU-008803 (East)



When this site was last re-permitted the sodium levels were found to be very high at the Valley Site, between 372 mg/L and 423 mg/L (DEQ, 1998). This can be problematic, given that sodium disperses clay and organic matter, thereby degrading soil structure and reducing macropore space, which consequently leads to soils that are poorly aerated and have reduced permeability to water (DEQ, 2007). During the course of the last permit cycle the facility has been sampling for the sodium absorption ratio (SAR) in order to provide information on the comparative amounts of sodium, calcium, and magnesium in the soil. The average SAR for the Valley Site from 1998-2006 was between 0.16 and 0.24, which would be considered low or slight, and levels have remained relatively constant, showing no definitive upward or downward trends (DEQ, 2005). SAR levels at the East Site were also well within the low range, with an average of 0.54. However, given the Valley Site's past history with high sodium levels staff recommends that SAR be sampled at the first and last year following the issuance of the new permit.

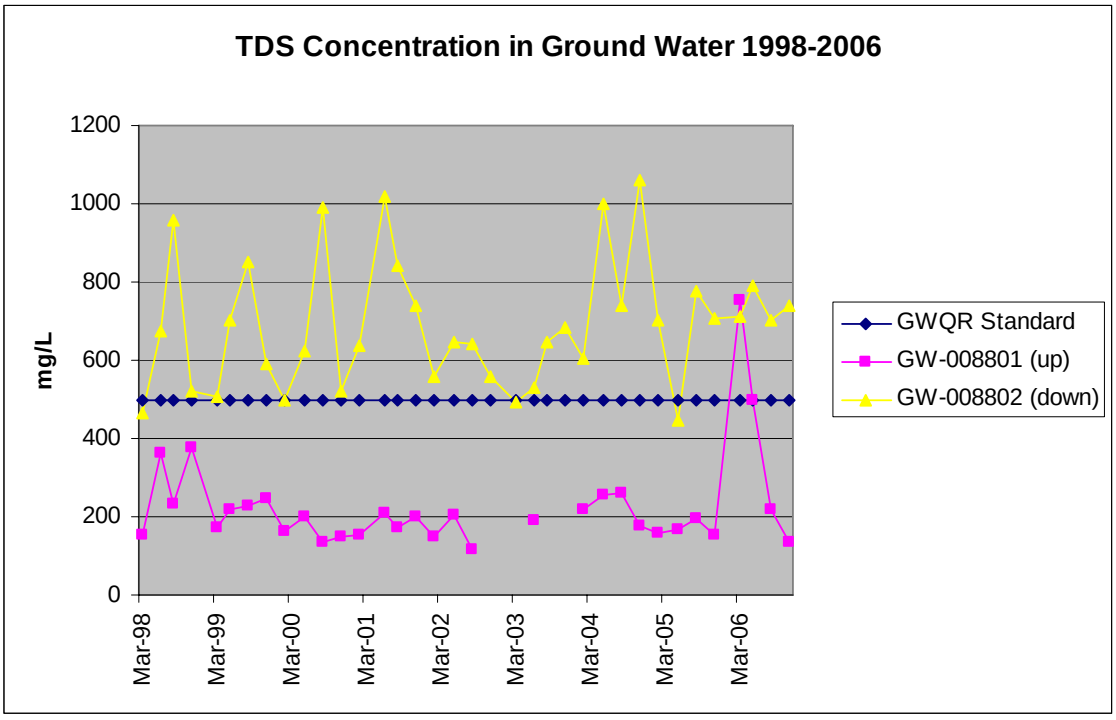
When the East Site was initially put into service in 1998 there was some concern over the fact that the soil salinity was at the high end of the generally accepted levels, with an average of 5520 umhos in the upper 22 inches of soil strata (DEQ, 1998). Since 1998 the electrical conductivity of the site has been much lower, possibly due in part to the leaching caused by land application, at an average of approximately 454 umhos/cm with a minimum of 86 umhos/cm in 2001 and a maximum of 1050 uhmos/cm in 2003. These values have fluctuated somewhat over the course of the permit term, as evidenced by the graph above, and are still slightly higher than those of the Valley Site but remain well below the 2,000 umhos/cm level which has been known to restrict the yield of sensitive crops. It is recommended that electrical conductivity continue to be monitored in order to ensure that levels remain within the acceptable range.

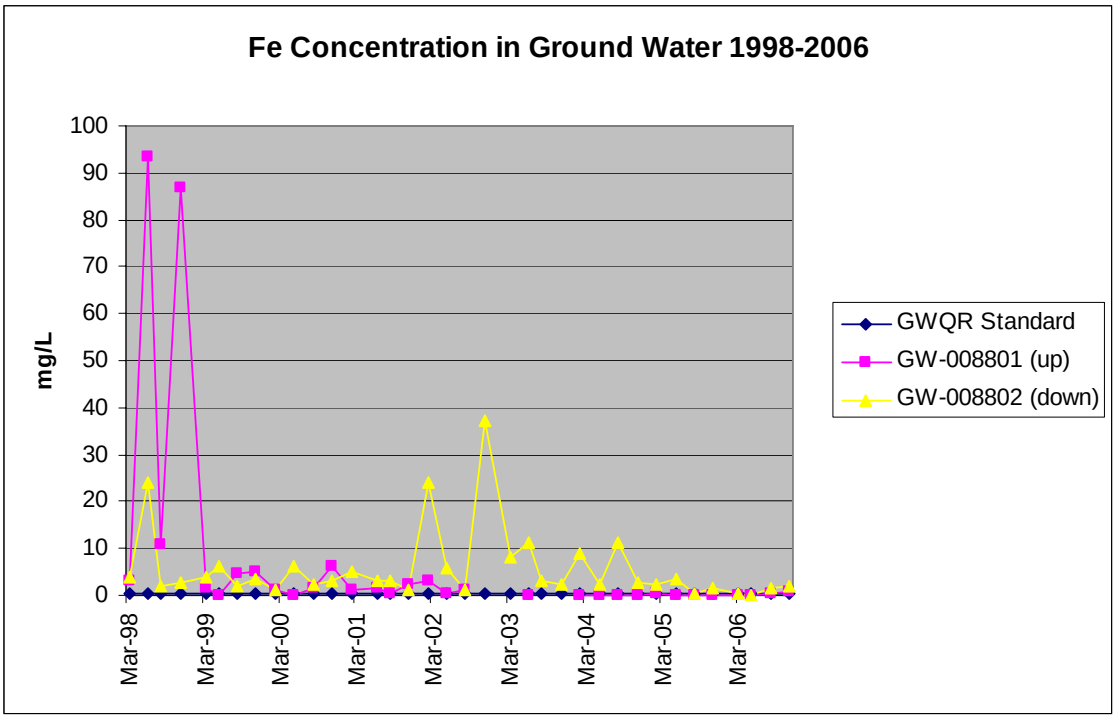
4.2 Ground Water

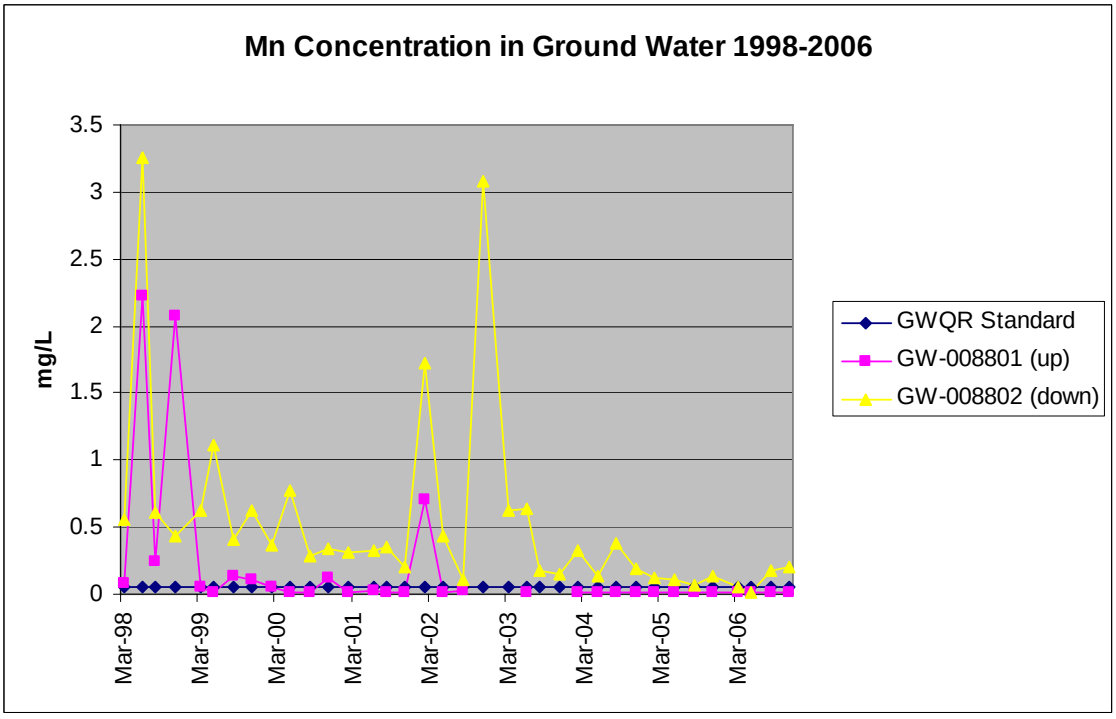
At the Valley Site, ground water exists in a layered aquifer formation consisting of three separate levels: a deep aquifer, a shallow aquifer, and a localized perched aquifer. The deep aquifer is estimated to be at least 500 feet below ground surface (bgs), while the shallow aquifer exists at approximately 160 ft bgs. Both of these aquifers experience the regional ground water flow, which is south-southwest in the general direction of the Snake River located approximately 4.4 miles from the facility (DEQ, 1998). The perched aquifer may be present only in localized areas and can rise to within 5 to 10 feet of the surface during the growing season (Keller, 2007).

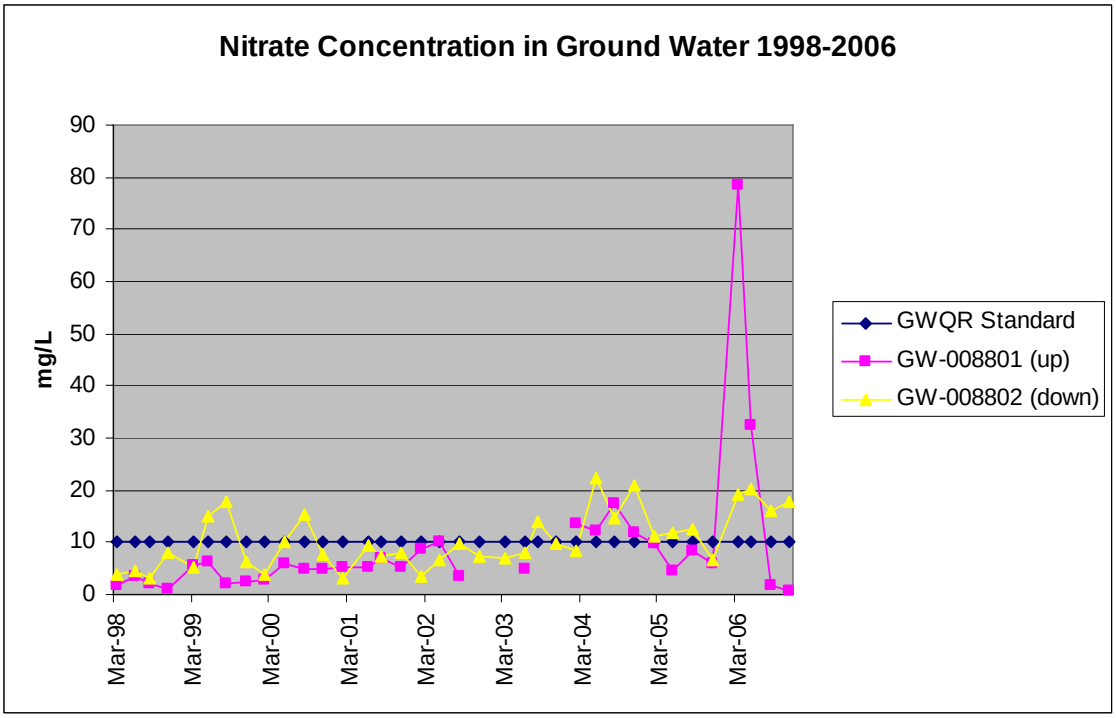
At the East Site, it is estimated that ground water occurs from approximately 480 to 490 feet bgs under confined conditions. However, like the Valley Site, there are some indications of the presence of an intermediate, unconfined or semi-confined aquifer in localized areas underneath the site. The regional ground water flow remains south-southwest toward the Snake River which is an estimated 4.0 miles from the East Site (CES, 1996).

The facility has a ground water monitoring network which consists of two wells, GW-008801 and GW-008802, located at the Valley Site. GW-008801 is positioned approximately a half mile east of the irrigation site near an irrigation well while GW-008802 is located to the west of the site near Pleasant Valley Road (Appendix 1, See Figure 1). Since the land application area at the site runs generally in a long, thin section from east to west while ground water flows south-southwest, GW-008801 serves as the up-gradient well while GW-008802 functions as the down-gradient well. Please see the plots below for semiannual ground water monitoring trends from 1998-2006 in comparison with their respective ground water quality standards (IDAPA 58.01.11.200.01.b). Note: All non-detect or less than values have been designated as the laboratory's corresponding minimum reporting limit for graphing purposes.




Fe Concentration in Ground Water 1998-2006
mg/L
100
90
80
70
60
50
40
30
20
10
0
Mar-98
Mar-99
Mar-00
Mar-01
Mar-02
Mar-03
Mar-04
Mar-05
Mar-06
GWQR Standard
GW-008801 (up)
GW-008802 (down)


Mn Concentration in Ground Water 1998-2006
mg/L
3.5
3
2.5
2
1.5
1
0.5
0
Mar-98
Mar-99
Mar-00
Mar-01
Mar-02
Mar-03
Mar-04
Mar-05
Mar-06
GWQR Standard
GW-008801 (up)
GW-008802 (down)



As evidenced by the graphs above, the facility's down-gradient well as been fairly consistent in its exceedence of the Ground Water Quality Standard (IDAPA 58.01.11.200.01.b) for total dissolved solids (TDS) of 500 mg/L during the permit cycle. Given the significantly lower TDS concentrations detected in the up-gradient well, it is probable that these levels are reflective of impacts from the land application site. In order to fulfill the conditions of Compliance Activity CA-088-03 of LA-000088-02 the facility performed seepage tests on the lagoons at the Valley Site in June of 2000. While the test results indicate that the lagoons met the DEQ requirements of less than 0.25 inches per day for the treatment lagoon and 0.125 inches per day for the storage lagoon, it is still possible that a portion of the TDS impacts seen in GW-008802 could be attributed to lagoon seepage. Staff recommends that the lagoons at both the Valley and East Sites be tested to determine current seepage rate losses (See Section E, CA-088-02 of the draft permit).

In addition to the elevated TDS levels, the down-gradient well has been almost universally in exceedence of the secondary constituent standards (IDAPA 58.01.11.200.01.b) for both iron and manganese. However, the up-gradient well also shows high concentrations of these constituents at times as well so it is difficult to definitively trace these levels to the land application site. It is possible that many of these exceedences could be due to high levels of turbidity in the wells, but without any dissolved samplings, the extent to which turbidity is a contributing factor is hard to ascertain. Staff recommends that the facility sample for dissolved Fe and Mn when total results exceed the aforementioned ground water standards in order to more fully determine the role of turbidity in the site's high ground water constituent levels.

Historically, nitrate levels have fluctuated rather widely in both the down-gradient and up-gradient well on the site. However, as depicted in the graph above, there has been a distinct upward trend in nitrate levels over the past 2-3 years, particularly in the down-gradient well. The

facility attributes this increase to the fact that while crops are still being grown, they have not actually been removed from the Valley field since 2005. Prior to 2005 the field was experiencing extremely poor yield, less than a ton per acre in 2003, which also could have contributed to excess nitrogen build up and thus the presence of the nitrates in the monitoring well. The majority of these problems appears to be due to difficulties with the facility's contract farmer; therefore staff recommends that a definitive cropping and harvesting plan as well as an adequate irrigation schedule be designed as part of the revised Plan of Operation (See Section E, CA-088-01 of the draft permit) to maximize both crop health and yield.

As has been previously mentioned, the facility monitoring well network consists solely of the previously discussed wells, both of which are located at the Valley Site. In 1998, during the previous permitting process, it was determined that a comparable well network was not necessary for the newly added East Site due to the fact that the anticipated constituent and hydraulic loading rates were expected to be either at or below crop requirements (DEQ, 1998). Current loadings remain such that staff feels that the site can continue to operate without significant ground water impacts. For further discussion of current and anticipated constituent and hydraulic loadings please refer to Section 4.5.

4.2.1 Municipal and Domestic Wells in Proximity to the Facility

There are several irrigation and domestic wells within a quarter mile radius of both the Valley and East Sites. There are three wells located west of both Pleasant Valley Road and the Valley Site, two of which are owned by Micron technology. Of the two wells owned by Micron, one serves as a domestic well while the other serves as an irrigation well. The third well in the area is owned by the Bureau of Land Management and serves as a stockwater well. The irrigation well No.1 for SICI is located at the east end of the Valley Site and the SICI domestic water supply wells No. 3 and No. 4 are positioned to the north of the East Site (Keller, 2007) (See Appendix 1, Figure 1). In order to fulfill the conditions of compliance activity CA-088-05 of LA-000088-02, the facility was required to submit a well location acceptability analysis for all of the domestic and municipal wells within a quarter mile radius of the Valley treatment site as well as a the chemical analytical results for TDS, NO3-N, Fe, Mn, and a number of other common ions; these results were due on December 31, 1998 and were received on March 17, 2000.

During the well location acceptability analysis and subsequent chemical testing at the Valley Site, the test company chemically analyzed only Micron's domestic well, as the remainder of the wells within the quarter mile vicinity of the site are all used for either irrigation or stock-watering purposes. All parameters tested, including iron, manganese, and TDS, were found to be below their respective ground water quality standards, indicating that the well was not being adversely affected by the land treatment site at the time of the assessment (Scanlan, 2000). As the other wells were not tested during this sampling it is difficult to make a definitive judgment with regard to the quality of their water and possible impacts from the Valley Site. However, both the BLM stockwater well and the SICI irrigation well, positioned on opposite ends of the site acreage, could be considered generally cross-gradient to the south-southwesterly ground water flow, which lowers their chances of receiving significant impact from the land application.

DEQ also completed a source water assessment on the SICI domestic supply wells No. 3 and No. 4, which are located up-gradient from the East Site, in February 2002. Both of the wells were rated as having moderate susceptibility to inorganic, volatile organic, and synthetic organic contaminants such as nitrates, pesticides, and petroleum products. Well No. 4 was also rated as having moderate susceptibility for microbial contamination; Well No. 3 however, due to prior detections of total coliform in the well, was rated as having high susceptibility for microbial contamination. These moderate ratings were mainly due to the lack of potential contaminant sources within the time of travel zones for the wells. The inorganic contaminants fluoride, barium, chromium, mercury, arsenic, and nitrate have all been detected in the wells but at levels which were below the maximum contaminant levels (MCLs) set by the EPA. Also, as has been previously mentioned, coliform bacteria were detected in Well No. 3 in June of 1998 and January of 2001 (DEQ, 2002). The State Safe Drinking Water Information System (SSDWIS) reports that since the 2002 source water assessment there have been several more detections of the inorganic contaminants fluoride, barium, and nitrate as well as a one-time detection of the organic contaminant xylene; however, all of the contaminants were below the MCLs on each occasion. No repeat detections of coliform bacteria have occurred in either of the wells since January of 2001 (SSDWISS, 2007). It is unlikely that any of these contaminants could be attributed to the land application site as the wells are not only up-gradient from the East Site, but also generally cross-gradient from the Valley Site.

4.3 Surface Water

The nearest surface water to both sites is Ten Mile Creek, which is located directly adjacent to the Valley Site and approximately 1 mile north of the East Site. The facility states that flow in the creek is intermittent, with water being present for only a few weeks during the spring, if at all. The flow observed in the spring of 2006 was reportedly the first in eight years (IDOC, 2006). According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) a portion of the Valley land application site is located within the 100 year flood plain for Ten Mile Creek (FEMA, 2003). Given the rather sporadic nature of the creek's flow in this region, however, it is not anticipated that flooding or surface water contamination will be a problem provided the site is managed according to the conditions of the draft permit. The East Site is located on a plateau well above Ten Mile Creek and outside the flood zone where surface water contamination should also not be an issue.

The only other surface water present in the area is the Snake River, which is located approximately 4.4 miles from the Valley Site and 4 miles from the East Site. While the river does drive the flow of ground water underneath the facility, it is has no other appreciable effects upon the facility nor should it experience any surface contamination effects from the land application sites.

4.4 Hydraulic Management Unit Configuration

As has been mentioned previously, the Valley Site consists of 70 acres while the East Site has 75 acres, giving the facility a total of 145 acres available for land application. The previous permit subdivided each of the two sites into two management units with corresponding soil monitoring unit designations. However, due to water shortages and difficulties with the contracting farmer,

the facility ceased using the full site acreage at the Valley Site in 2002, after which between 32 to 34 acres were utilized each season. It is uncertain as to the portions of which management unit were contained within the reduced acreage as the facility only submitted the total loadings for the site, rather than the individual units, in their annual reports. With regard to the East Site, only the 45-acre north field was used during the first land application year (1998) after which the total acreage was gradually expanded to include 8 acres from the 30-acre south field. In 2003 the total site acreage utilized was reduced to 28 acres; but again, the exact location of these acres in relation to the management unit designations is unknown. No changes have been proposed to the current hydraulic management units, so staff recommends that unit designations remains the same as those in LA-000088-02; however, it is suggested that the facility monitor and calculate both the hydraulic and constituent loadings for each management unit individually rather than site-wide. Please refer to the draft permit, Section G for the monitoring requirements and Appendix 2 for the hydraulic management unit designations.

4.5 Wastewater Flows and Constituent Loading Rates

Trending of wastewater flow rates and rationale for constituent and hydraulic loading rates appearing in the draft permit are discussed below.

4.5.1 Wastewater Flows

Currently, the Valley system serves approximately 1,925 inmates with an estimated influent flow rate of 198,000 gallons per day (gpd) while the East system serves 1,072 inmates in addition to receiving all the wastewater from the ISCI food service for an estimated influent flow rate of 165,000 gpd, for a total estimated influent flow of 363,000 gpd. Influent is treated and then stored in either the 43.8 MG lagoon at the Valley Site or the 38.1 MG lagoon at the East Site for disinfection and land application during the growing season (March 15 to October 31).

Since the permit re-issuance in 1998 the facility had been gradually increasing the wastewater loading to both of their sites until they were applying an average of approximately 65 MG to 70 acres of the Valley Site and 45 MG to 53 acres of the East Site. Then in 2002 and 2003 both the acreage utilized and the amount of wastewater applied to the sites dropped dramatically, with the Valley Site now applying an average of 27 MG on 34 acres and the East Site applying 18 MG on 28 acres. Clearly, it is storage, rather than land application acreage, which is the limiting factor in both systems, as supplemental irrigation water would be required to fully utilize the available acreage. The 1998 expansion to the East Site increased total capacity of the facility to 490,000 gpd (DEQ, 1998) and the facility states that this storage capacity will be able to accommodate current flows plus an additional 25-30% (Keller, 2007). For a more detailed discussion of current and future hydraulic loading rates please see Section 4.5.2.3.

4.5.2 Constituent Loading Rates

The sections below discuss proposed constituent loading rates, including nitrogen, total dissolved solids, hydraulic, chemical oxygen demand (COD), and phosphorus. Recommended loading rates for inclusion into the draft permit, Section F, are also discussed.

4.5.2.1 Nitrogen Management and Loading Rates

Wastewater Reuse permits typically include a nitrogen loading rate limit of 150% of typical crop uptake, and based upon historic loadings the facility is not likely to exceed this limit. Over the past permit cycle an average of 55 pounds per acre (lb/ac) of nitrogen was applied to the Valley Site and an average of 64 lb/ac was applied to the East Site. The facility typically grows either alfalfa or grass hay with an average yield of 3.1 ton/acre for the Valley Site and 2.0 ton/acre for the East Site. Assuming a crop nitrogen uptake of 50 lb/ton for alfalfa hay and 18 lb/ton for green chop, and given the facility's average yields, this gives an average crop nitrogen uptake of 130 lb/ac for the Valley Site and 126 lb/ac for the East Site. This indicates that with proper irrigation and crop management the facility should remain well below the aforementioned 150% crop uptake loading rate recommended in the draft permit.

4.5.2.2 Total Dissolved Solids (TDS) Loading Rates

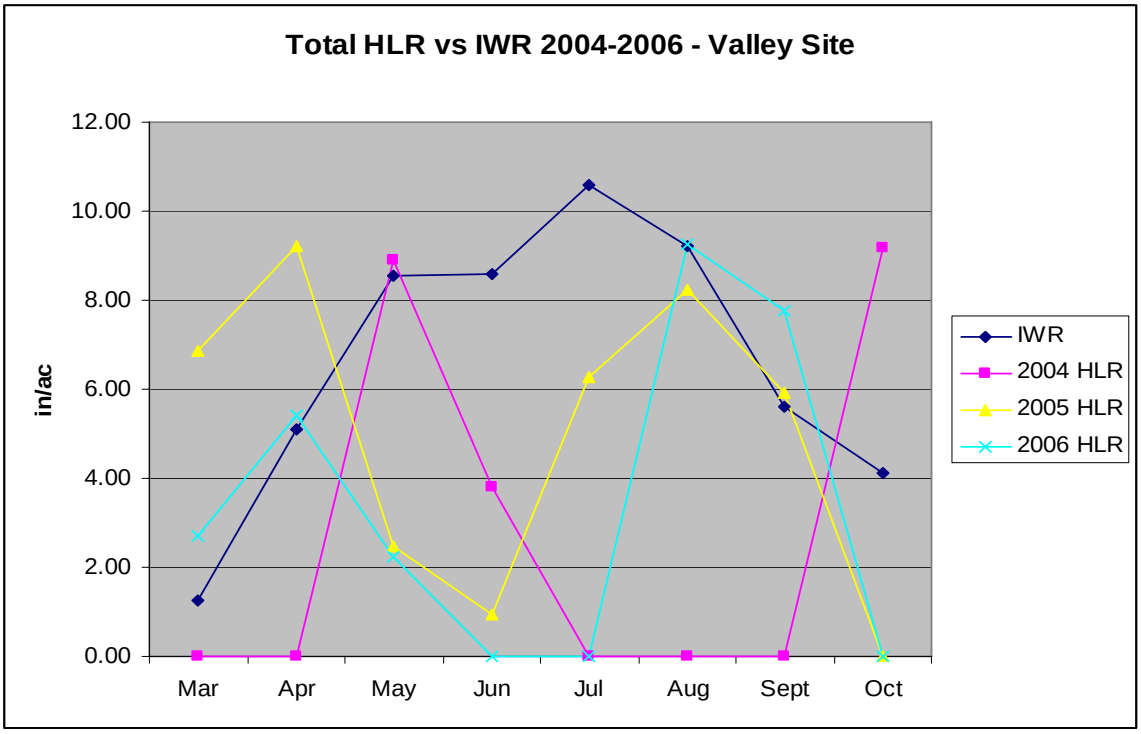
Total dissolved solids (TDS) loading rates from wastewater and irrigation water can have significant impacts to ground water TDS levels. Total dissolved solids measured in ground water are commonly inorganic constituents (salts); however, TDS in wastewater can include significant quantities of organic constituents in addition to salts. For modeling and other environmental evaluation purposes, it is important to measure inorganic wastewater TDS. The current permit requires measurement of both TDS and volatile dissolved solids (VDS), the latter being a rough estimate of organic constituents. The difference between TDS and VDS is termed non-volatile dissolved solids (NVDS) and can be used as a rough estimate of the salts in wastewater. Since 1998 TDS and VDS concentrations in the wastewater have remained fairly constant with the average TDS concentration being approximately 534 milligrams per liter (mg/L) and the average VDS concentration being 105 mg/L.

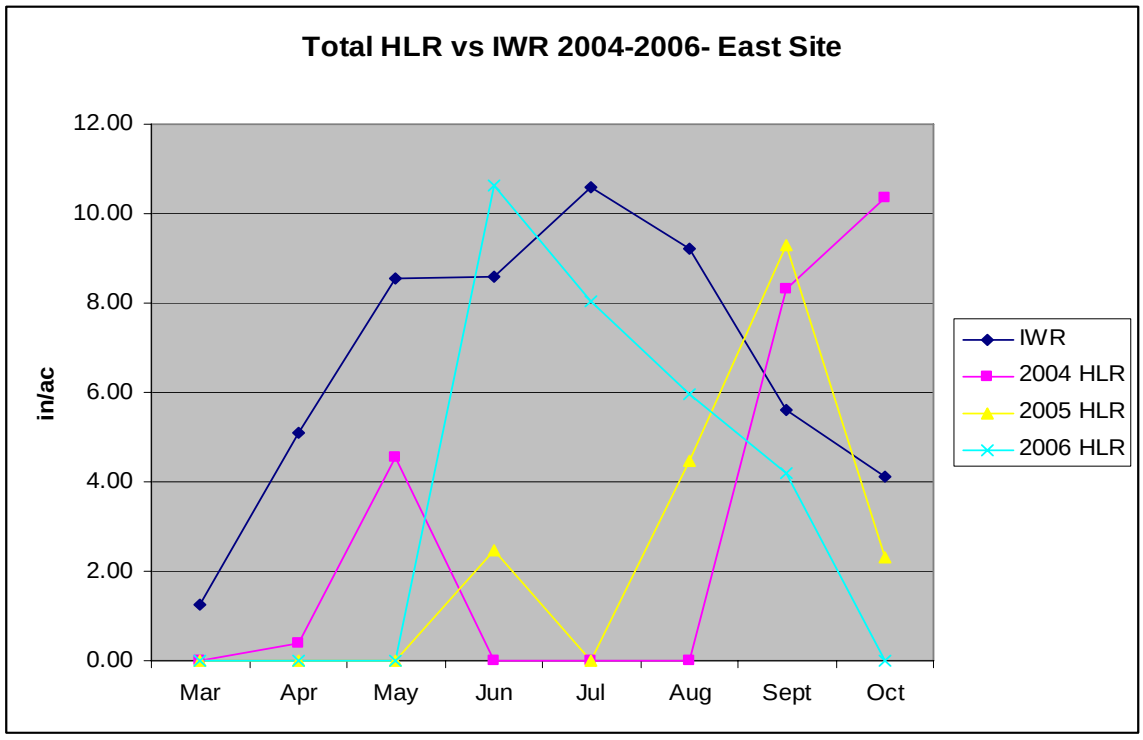
These wastewater concentrations have lead to an average NVDS loading of 2730 lb/ac on the Valley Site and 2737 lb/ac on the East Site. As has been discussed previously, the down-gradient monitoring well at the Valley Site has been fairly consistent in its exceedence of the secondary standard for TDS of 500 mg/L, while the up-gradient well has only exceeded the aforementioned standard on two occasions. While this indicates some kind of impact from the land application site it is difficult to say how much could be attributed to actual application of wastewater and how much is due to seepage from the nearby lagoons. Given the overall hydraulic loadings the site, the amount of leaching taking place should be minimal. Staff recommends that that the lagoons at both the Valley and East Sites be tested to determine current seepage rate losses (See Section E, CA-088-02 of the draft permit).

4.5.2.3 Hydraulic Loading Rates

Permit LA-00088-02 gave the total maximum hydraulic loading limits as 72.8 MG per year or 38 inches per acre (in/ac-yr) per year for the Valley Site and 67.2 MG per year or 33 in/ac-yr for the East Site. The facility has been substantially below these limits for the majority of the permit cycle, with the exception of 2001 during which 76.9 MG of wastewater was applied to the Valley Site plus and additional 23.6 MG of supplemental irrigation water, which greatly exceeded the aforementioned limit.

In theory, growing season hydraulic loading should substantially be the irrigation water requirement (IWR) for the crop in question. Currently, the facility operates at a total yearly deficit of anywhere from 13 to 31 in/ac at the Valley Site and 24 to 35 in/ac at the East Site. The graphs below contain the total hydraulic loading rates (HLR) from 2004-2006 in comparison with the 30 year IWR for alfalfa with less frequent cutting effects (Allen, 2007).





As evidenced by the above plots, not only are the crops not receiving an adequate amount of water during the growing season, what water they do receive is not being applied at the optimum times. The large deficits seen in June, July, and August can be particularly detrimental to crop health and thereby restrict both crop yield and nutrient uptake. Crop yields for this facility have consequently been rather low. The USDA National Agricultural Statistics Service gives average crop yield for irrigated alfalfa hay in Ada county between 1998-2005 as 5.0 ton/ac (USDA, 2007) whereas average yields have been 3.1 ton/ac at the Valley Site and only 2.0 ton/ac at the East Site (IDOC 1998-2006). Staff recommends that the IWR be calculated using 30 year average data for the area and that sufficient supplemental irrigation water be added to the wastewater to meet these requirements; thereby improving both crop yield and nutrient uptake.

4.5.2.4 COD Loading Rates

Wastewater Reuse permits typically include a chemical oxygen demand (COD) permit loading rate limit of 50 pounds/acre-day (lb/ac-day) per season. During the last permit cycle an average of 6 lb/ac-day was applied at the Valley Site, with a minimum of 2.5 lb/ac-day in 1998 and a maximum of 10.7 lb/ac-day in 2000. Meanwhile, at the East Site an average of 9 lb/ac-day was applied with a minimum of 5.3 lb/ac-day in 1998 and a maximum of 15.8 lb/ac-day in 2006. In light of these historic loading rates it is unlikely that the facility will exceed the 50 lb/ac-day seasonal average and staff therefore recommends that the facility continue to be held to this standard.

4.5.2.5 Phosphorus Loading Rates

Currently, there is no phosphorus loading limit included in the draft permit as phosphorus loading rates are generally set by DEQ based upon either ground water or surface water

concerns. With respect to ground water concerns, DEQ does not usually set a phosphorus loading limit where there is no ground water – surface water interconnection (i.e. where ground water discharging from the down-gradient boundary of the treatment site does not enter surface water), which is the case here. Ground water on the site flows from north to south-southwest, away from Ten Mile Creek; and while a portion of the Valley Site is located within its flood plain, Ten Mile Creek is an intermittent water source at best (See Section 4.3). Given an adequately designed runoff plan, phosphorus contamination to Ten Mile Creek should not become a concern. However, as a precautionary measure a standard runoff provision is recommended, directing the facility to employ best management practices in the prevention of runoff. For the full text of this condition see Section F of the draft permit.

4.6 Buffer Zones and Disinfection

The current permit, LA-00088-02, requires that the applied wastewater from the facility be disinfected such that the 30 day median coliform count does not exceed 230 colony forming units (cfu) per 100 mL and that 500 foot buffer zones be maintained from areas of public access and private water supply wells; and 1,000 foot buffer zones be maintained from inhabited dwellings and public water supply wells, with the exception of ISCI Well No. 4 which is located 500 feet north, or up-gradient from the East Site. Special dispensation was given to ISCI Well No. 4 based upon a capture zone analysis prepared by the facility's consultant during the previous permit cycle (DEQ, 1998).

In order for the facility to meet the current requirements (IDAPA 58.01.17.600.07.d) for Class D wastewater the effluent must not exceed a median of 230 cfu/100 mL, or 2,300 cfu/100 mL in any one confirmed sample, as determined from the bacteriological results of the last three days for which analyses were completed; and said analysis shall be based upon monthly sampling during periods of application. As has been previously mentioned, the facility disinfects their effluent via 30 minutes in a chlorine contact chamber prior to land application. Despite this, however, they have had some difficulty maintaining the level of disinfection required under LA-00088-02 and it appears they may continue to have difficulty doing so under the new requirements unless changes are made; though it should be noted that under the current standard monthly samplings for Class D wastewater it is possible that fewer exceedences will be observed than under the weekly samplings that were required by LA-000088-02. IDOC has stated that they are in the process of developing a plan of operation to address this issue. Compliance Activity CA-0088-03 of the draft permit addresses a proposed timeline for the submission and implementation of this plan.

In addition to the disinfection requirements, the land application of Class D wastewater also requires that the following buffer distances be adhered to:

- 1000 ft from reuse site and public water supply wells*
- 1000 ft from reuse site and inhabited dwellings
- 500 ft from reuse site and private potable supply wells
- 500 ft from reuse site and areas of public access
- 100 ft from reuse site and permanent or intermittent surface water
- 50 ft from reuse site and irrigation ditches/canals

* With the exception of ISCI Well No. 4 which has a previously approved reduced buffer distance of 500 ft.

4.7 Plan of Operation and Other Compliance Activities

Section 1.0 of the Application (page 1) states that an updated facility plan of operation would be submitted after permit issuance as an anticipated permit compliance condition.
It is understood that a plan of operation is a living document and is modified as operations and regulatory requirements change. Section E , condition CA-088-01, as it appears in the draft permit, attached, requires the facility to submit a Plan of Operation for DEQ review and approval. For the full text of the condition, see Section E of the draft permit.

In addition to the submission of an updated Plan of Operation, it is also recommended that the facility be required to perform seepage testing on all lagoons at both the Valley and East Sites. For the full text of the condition, see to Section E, CA-088-02.

In order to address the issues the facility's wastewater disinfection system, it is recommended that IDOC be required to submit a Disinfection Management Plan that defines the approach the facility will take to meet and/or exceed the permit standard of disinfection, either by more efficient management and utilization of the current system or, if necessary, improvement to the system itself. For the full text of the condition, see Section E, CA-088-03.

5.0 Conclusion

The following recommendations fall into three major areas. They include loading rate related recommendations, ground water related recommendations, soil related recommendations, and other recommendations.

5.1 Loading Rate Related Recommendations

1. It is recommended that all hydraulic management units be managed and loaded hydraulically during the growing season as discussed in Section 4.5.2.3. See Section F of the draft permit.

2. COD loading rates should be 50 lb/acre-day for growing season as discussed in Section 4.5.2.4. See Section F of the draft permit.

3. It is recommended that all management units have a nitrogen loading rate of 150% of typical crop uptake as discussed in Section 4.5.2.1. See Section F of the draft permit.

5.2 Ground Water Related Recommendations

It is recommended that the facility continue to sample ground water on a quarterly basis. Also, when total iron and manganese are in exceedence of their respective ground water quality standards, it is recommended that dissolved iron and manganese be sampled for as well in order

to more fully ascertain the role of turbidity in these elevated levels as discussed in Section 4.2. See Section G of the draft permit.

5.3 Soil Related Recommendations

It is recommended that the facility continue to perform soil samplings on a semiannual basis, in March and November of each year. In addition, it is recommended that sodium absorption ratio be sampled for only in the first and last years of the permit, given the significant improvements the Valley Site has shown in SAR levels over the past permit cycle as discussed in Section 4.1. See Section G of the draft permit.

5.3 Other Recommendations

It is recommended that all disinfection limits be met and buffer zones be maintained as discussed Section 4.7. See Section F of the draft permit.

6.0 References Cited

Allen, Richard G and Clarence W. Robison. Evapotranspiration and Consumptive Irrigation Water Requirements for Idaho. Precipitation Deficit Table for Boise WSFO Airport. 2007. **http://www.kimberly.uidaho.edu/ETIdaho/**

CES, 1996, State of Idaho Application for Wastewater Land Application Permit Idaho State Correctional Institution, Boise, Idaho, March 1996.

Department of Environmental Quality, 2007, Guidance for Reclamation and Reuse of Municipal and Industrial Wastewater-Revised Section 2, April 2007

Department of Environmental Quality, 2005, Guidance for Reclamation and Reuse of Municipal and Industrial Wastewater, December 2005

Department of Environmental Quality, 2002, IDOC Idaho State Correctional Institute (PWS 4010141) Source Water Assessment Final Report, February 2002

Department of Environmental Quality, 1998, Idaho State Correctional Institution, Land Application Permit LA-000088-02 (Municipal Wastewater)—Staff Analysis (revised March 12, 1998), March 1998.

Federal Emergency Management Agency, 2003, Flood Insurance Rate Map—Ada County, Idaho and Incorporated Areas, February 2003

Idaho Department of Correction, 2006, Land Application Status Report 2006, December 2006.

Idaho Department of Correction, 2005, Land Application Status Report 2005, December 2005

Idaho Department of Correction, 2005, Land Application Status Report 2004, January 2005

Idaho Department of Correction, 2003, Land Application Status Report 2003, December 2003

Idaho Department of Correction, 2003, Land Application Status Report 2002, January 2003.

Idaho Department of Correction, 2001, Land Application Status Report 2001, December 2001.

Idaho Department of Correction, 2000, Land Application Status Report 2000, December 2000.

Idaho Department of Correction, 2000, Land Application Status Report 1999, January 2000.

Idaho Department of Correction, 1999, Land Application Status Report 1998, February 1999.

Keller Associates, Inc. 2007, Technical Report for Reuse Permit Application for Wastewater Land Application LA-000088-02, February 2007.

National Resources Conservation Service, 2007, Soil Survey of Ada County Area, Idaho, February 2007.

Scanlan Engineering, 2000, Well Location Acceptability Analysis—Wastewater Land Application Permit Compliance Activity Number CA-088-05

State Safe Drinking Water Information System, 2007, SDWIS Violation Report—IDOC Idaho St Correctional Inst ISCI, May 2007

United States Department of Agriculture—National Agriculture Statistics Service, 2007, Crop Yield for Irrigated Alfalfa Hay in Ada County, Idaho 1998-2005, May 2007

Appendix 1

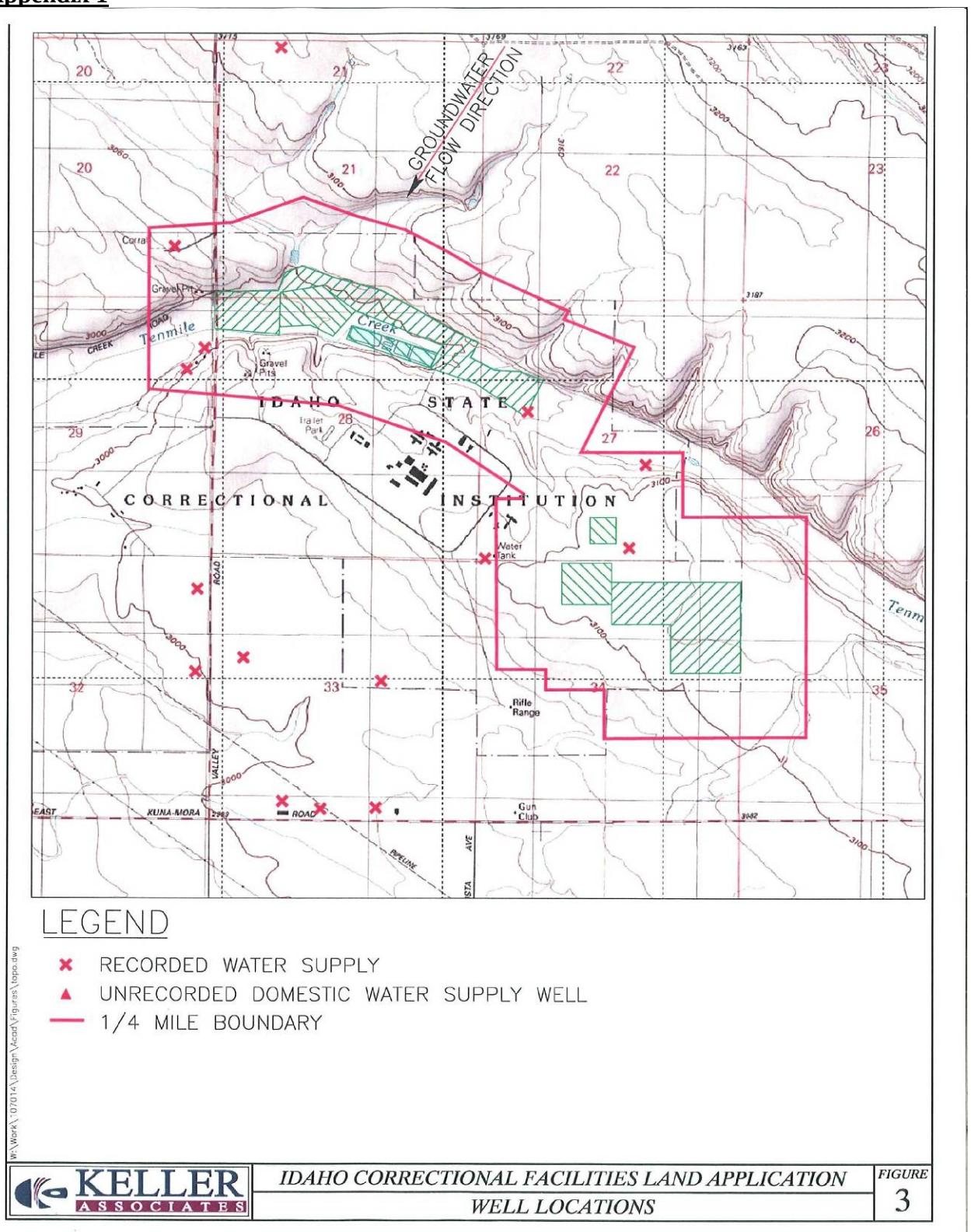


Figure 1. . **Municipal, Domestic, and Monitoring Wells. Keller Associates, February 2007.**